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Record of Decision
Early Implementation Action
Remedial Alternative Selection

Site: Stringfellow Acid Pits, Glen Avon, California

DOCUMENTS REVIEWED

My decision is based in part on review of the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Stringfellow site:

- Summary of Remedial Alternative Selection (attached)
- Responsiveness Summary (attached)
- "Assessment of an Extraction Well Barrier in the Lower Canyon, a Proposed Early Implementation Action at the Stringfellow Hazardous Waste Site," Draft Report, SAIC, December 16, 1986.
- "An Assessment of Drainage Improvements at the North End of the Canyon, a Proposed Early Implementation Action at the Stringfellow Hazardous Waste Site," Draft Report, SAIC, February 3, 1987.
- July 18, 1984 Record of Decision for the Stringfellow Acid Pits Site.
- Summary of Remedial Alternative Selection for the July 18, 1984 Record of Decision for the Stringfellow Acid Pits Site.
- Responsiveness summary addressing the comments made by governmental agencies and the public concerning the Fast Track Remedial Investigation/Feasibility Study (Fast Track) report for the Stringfellow site, Riverside, California, issued May 18, 1984.

DESCRIPTION OF SELECTED REMEDY

- Installation of a groundwater barrier system in the lower canyon area and treatment of extracted groundwater, if necessary, followed by discharge to a POTW.
- Installation of a peripheral channel around the north end of the original site to direct upgradient surface water runoff.

- Based on the July 18, 1984 Record of Decision, the existing gunite channels will be extended southward to discharge surface water to Pyrite creek. The length of extension of the gunite channels will depend on an evaluation presently being conducted by the State of California Department of Health Services.

DECLARATION

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA or 1986 Act), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, I have determined that at the Stringfellow site, the selected remedial alternative is a cost-effective measure and provides adequate protection of public health and welfare and the environment. The State of California has been consulted and concurs with the approved remedy. In addition, the action will require operation activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies until implementation of the remedial action for final closure.

I have also determined that the action being taken is consistent with Section 121 of SARA and is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

The State of California is currently conducting a full-scale Remedial Investigation/Feasibility Study to identify and evaluate methods to prevent or manage upstream groundwater and surface water entering the site, to prevent migration of hazardous substances off-site, and to define aquifer characteristics, the extent of the contaminant plume, and methods of controlling migration. A cost-effective remedial action for final site closure will be developed. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of future remedial actions.

6.25.87
Date

John Wise
John Wise
Deputy Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
(EARLY IMPLEMENTATION ACTIONS)
STRINGFELLOW ACID PITS
Glen Avon, California

SITE LOCATION AND DESCRIPTION

The Stringfellow site is located in Riverside County, approximately 5 miles northwest of the City of Riverside and one mile north of the community of Glen Avon. The site is located at the head of Pyrite Canyon which lies in the southern portion of the Jurupa Mountains, approximately 4,500 feet north of the intersection of U.S. Highway 60 and Pyrite Street (see Figure 1). Stringfellow site investigation areas referred to in this document are defined in Figure 2.

The watershed area tributary to the disposal site is approximately 270 acres. Groundwater beneath the site moves in an aquifer bounded by canyon walls to the north, east and west. Water flows toward the south, exiting the canyon just north of Highway 60 and entering the regional groundwater system under the Glen Avon community, and then travels toward the southwest. The groundwater supply is also used for industrial and agricultural purposes. Surface runoff from the canyon moves southwesterly from the site and collects in a culvert drop box just north of Highway 60. Surface runoff then flows under the highway through Glen Avon in lined and unlined channels, and eventually to the Santa Ana River, a total distance of approximately 7 miles.

The site is surrounded by undeveloped land which is primarily used as rangeland. An operating quarry is located about a quarter of a mile downgradient of the site on the western side of the canyon.

SITE HISTORY

The site was operated by the Stringfellow Quarry Company from August 21, 1956 to November 19, 1972 as a hazardous waste disposal facility. Approximately 34 million gallons of industrial wastes, primarily from metal finishing, electroplating and DDT production, were deposited in evaporation ponds on the site. Site operations also included spray evaporation of pond contents to accelerate volume reduction. The total disposal area was approximately 17 acres. The site was voluntarily closed in 1972. In 1969 and 1978, excessive rainfall caused the disposal ponds to overflow. The overflows extended south of Highway 60 into Glen Avon. In 1980 and 1981, the Santa Ana Regional Water Quality Control Board (RWQCB) implemented an Interim Abatement Program at the disposal site as the first phase of site closure. The

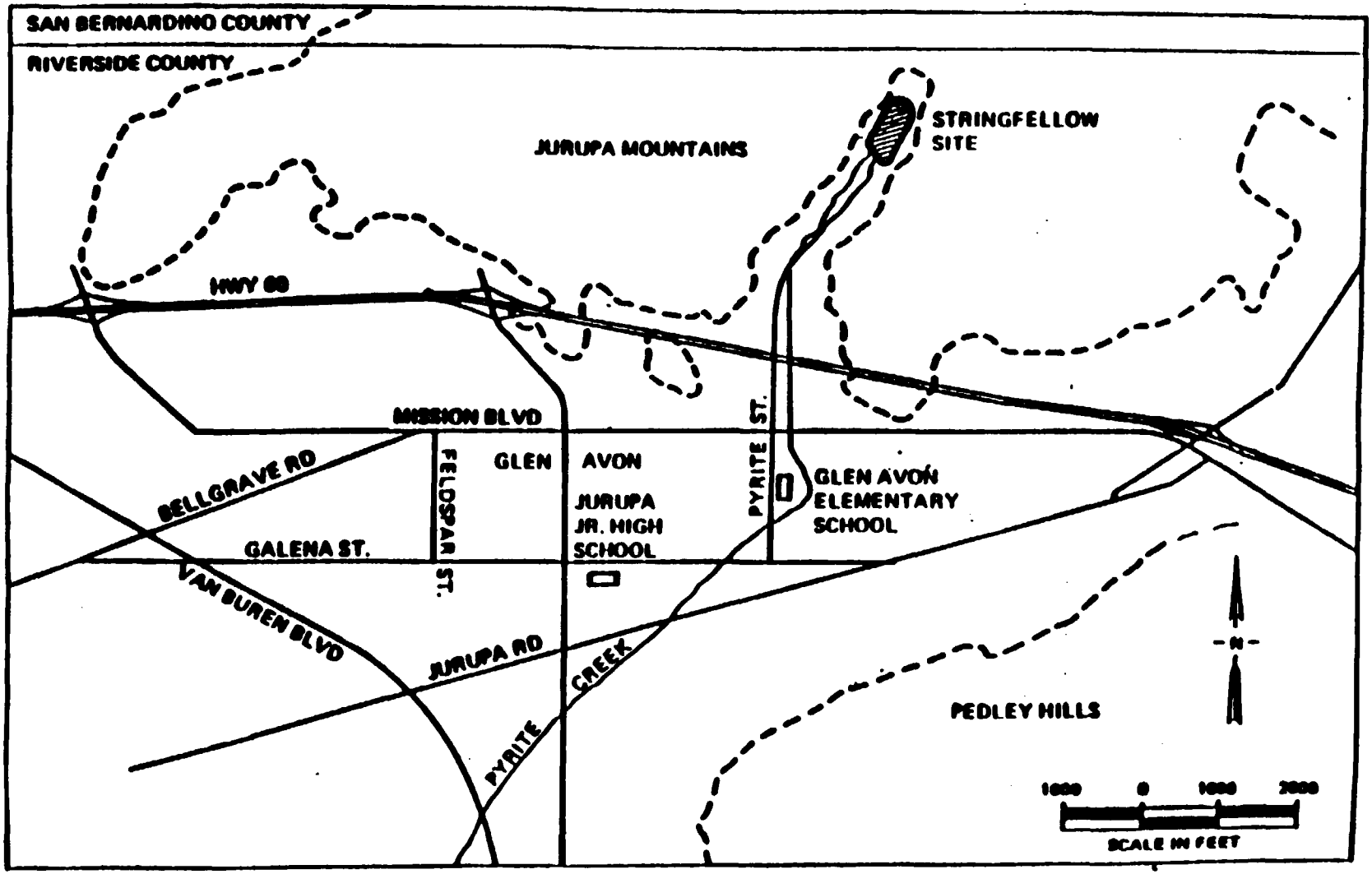

FIGURE 1 Location of the Stringfellow Waste Disposal Site

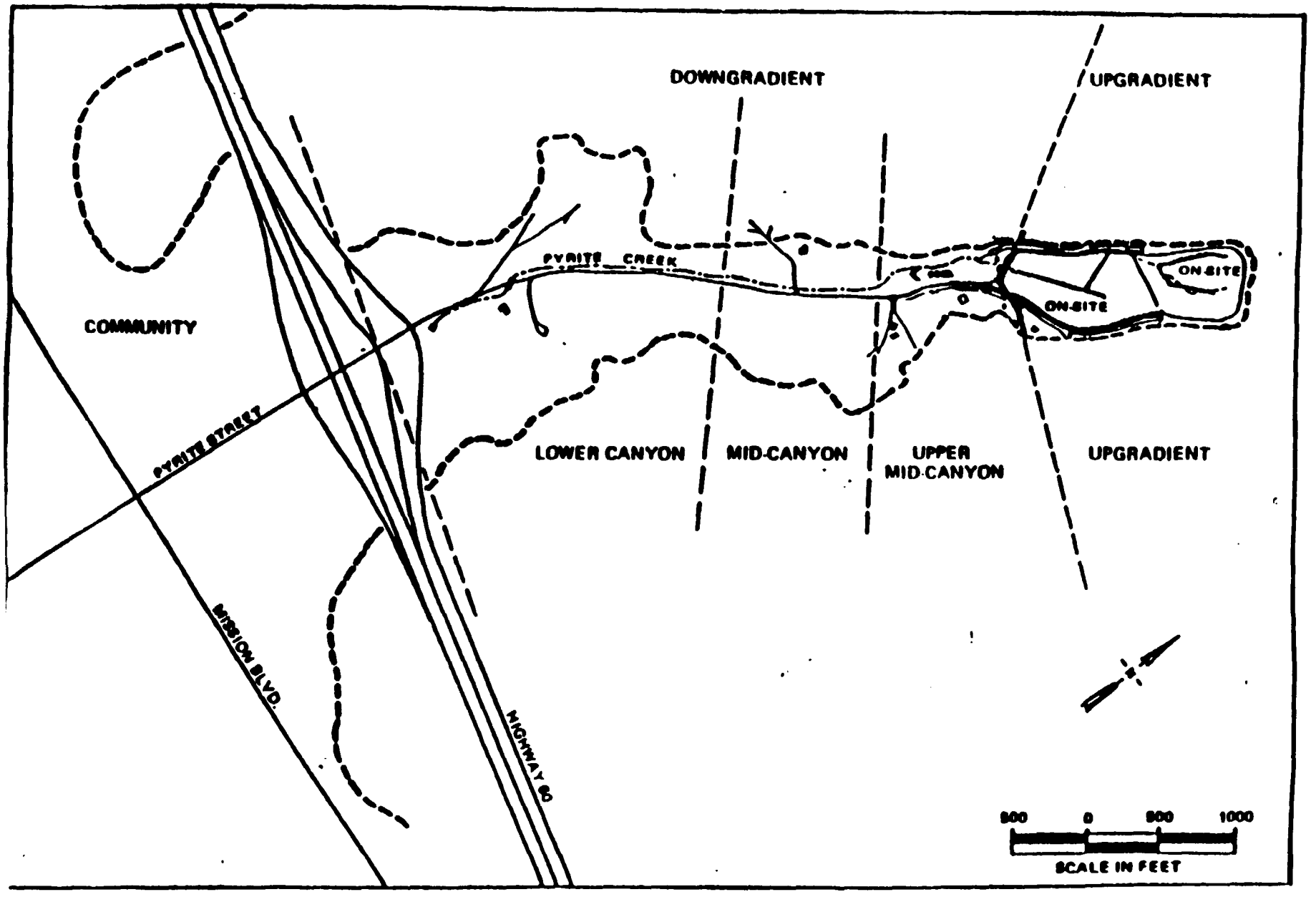

FIGURE 2 Stringfellow Site Investigation Areas

program included removal of all surface liquids, partial neutralization and capping of the wastes, installation of a gravel drain and a network of extraction, interceptor and monitoring wells onsite and downgradient of the site, diversion of surface water around the site via concrete channels, and construction of a clay core barrier dam and leachate collection system downgradient of the disposal ponds to stop migration of subsurface leachate.

An EPA-lead Fast Track Remedial Investigation/Feasibility Study (RI/FS) was conducted by EPA's contractor CH2M HILL from September 1983 to May 1984 to identify and evaluate alternatives to onsite groundwater extraction and offsite disposal operations in practice at that time. The selected alternative, or interim measure, would be implemented during the 3 to 5 year period prior to completion of the full-scale RI/FS and implementation of the final remedy.

Response actions including state-lead and EPA-lead activities through July 1984 are described in the July 18, 1984 Record of Decision (ROD) for this site. Since July 1984, three main activities continue, as described below:

PRETREATMENT PLANT

Based on the results of the Fast Track RI/FS, the July 1984 ROD documented the selection of the interim measure to install a treatment facility onsite to treat contaminated groundwater from the onsite and downgradient areas. It also approved the installation of additional interceptor and monitoring wells to assure effective interception of contaminated groundwater. The pretreatment system consists of lime precipitation for heavy metals removal followed by granular activated carbon treatment for organics removal. Treated effluent is trucked to a local sewer line drop point for disposal. Effluent receives additional treatment at the publicly-owned treatment works (POTW) and then is discharged to the ocean. Sludge from the pretreatment process is taken to a RCRA approved land disposal facility.

The design of the pretreatment plant was completed and went out to bid in October 1984. Construction of the plant began near the site in the mid-Canyon area in January 1985 and was completed in November 1985. Design and construction of the pretreatment facility was performed through contractors of the California Department of Health Services (DHS). EPA's REM II contractor, Camp Dresser and McKee (CDM) began operating the plant in December 1985. Startup operations at the plant began in December 1985 and were completed in February 1986. During this period, responsibility for the pretreatment plant was transferred to the U.S. Army Corps of Engineers under an inter-agency agreement (IAG) with the EPA. A

request for proposals (RFP) for operations was issued in February 1986, and this process culminated in the selection of CDM for long-term operations in May 1986. The amount of groundwater extracted and treated since the startup of the pretreatment plant is approximately 150,000 gallons per week. The treated effluent is being trucked to a local POTW system drop point (Santa Ana Watershed Project Authority SARI sewer line), so that it receives additional treatment at the County Sanitation Districts of Orange County (CSDOC) POTW. The sludge from the pretreatment plant is disposed of at a RCRA approved facility.

FULL SCALE RI/FS

A full scale comprehensive RI/FS is being conducted by DHS contractor SAIC to characterize the site and to identify and evaluate alternatives for final site cleanup. Field investigations have been completed and the draft RI report is expected to be released for public comment during spring of 1987. An assessment of 86 potentially applicable technologies has been conducted, and reported in July 1985.* Applicable technologies were combined into remedial action alternatives. Initial screening of the remedial action alternatives was performed and a draft report issued in May 1986.** Detailed evaluation of the remaining alternatives is being performed at this time. Also, several treatability studies are being completed. The FS report is expected to be completed by early 1988.

ALTERNATIVE WATER

During analysis of water samples from onsite, mid-canyon, and community wells, radiation was detected. In response, DHS conducted a sampling of private drinking water supply wells in the area. At the end of the summer of 1984, DHS initiated an interim program to provide bottled water to nearly 400 Glen Avon residences to eliminate any dependence

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* "Stringfellow Facility Remedial Investigation/Feasibility Study Draft Interim Report on Development and Screening of Remedial Technologies And Alternatives" by Science Applications International Corporation, Riverside, California, July 31, 1985.

** "Stringfellow Facility Remedial Investigation/Feasibility Study Combined Tasks XI and XII Development And Initial Screening of Alternatives" by Science Applications International Corporation, La Jolla, California, May 30, 1986.

on groundwater near the influence of contamination from the Stringfellow site, and to give anyone in identified areas of elevated groundwater radioactivity, regardless of the source, an alternative supply of domestic water. In October 1985, Senate Bill 1063 provided state funds to hook up residences receiving state supplied bottled water to the Jurupa Community Services District water supply. The first connections occurred in June 1986. Approximately 75 percent (350 residences) of the hookups have been completed, and the remaining hookups are expected to be completed by the end of 1987.

SITE STATUS

NATURE AND EXTENT OF CONTAMINATION

This section presents information based on the July 1984 ROD and subsequent published information. The draft RI report expected to be released during Spring 1987 will fully present the most recent data that are not presented here.

In general, groundwater is heavily contaminated in the onsite area and contaminant levels decrease in the downgradient direction. The contaminants include metals, sulfates, nitrates, fluoride, chloride, and a variety of organics, including TCE, chlorobenzene, chloroform, dichlorobenzene, and phenol. These contaminants are consistent with the types of wastes disposed at Stringfellow. An organic material (not a "priority pollutant"), para-chlorobenzenesulfonic acid, is a dominant component of the onsite wastes, comprising as much as 50 percent of the total organic matter. Although elevated radiation levels are found in onsite groundwater/leachate, radiochemical speciation analyses have not indicated any relationship between Stringfellow wastes and detections of gross alpha radioactivity at just above drinking water standards in some private community wells.

Contaminated groundwater seems to be following a relatively narrow zone (300 to 400 feet wide) in the lower canyon area. More recent ongoing RI activities indicate a wider zone of contaminated groundwater (approximately 900 feet wide) in the community area. This premise is supported by soil gas sampling and groundwater analyses from wells in these areas. Additionally, very low concentrations of contaminants may be found outside of this zone. Figure 3 shows the monitoring wells near the freeway and the TCE concentrations (SAIC routine sampling data 1985) in these wells ("Assessment Of An Extraction Well Barrier In The Lower Canyon, A Proposed Early Implementation Action At The Stringfellow Hazardous Waste Site" by SAIC; La Jolla, California; December 16, 1986). The thick line on Figure 4 indicates the approximate center of the plume. In the lower canyon area the alluvium is the most highly contaminated unit.

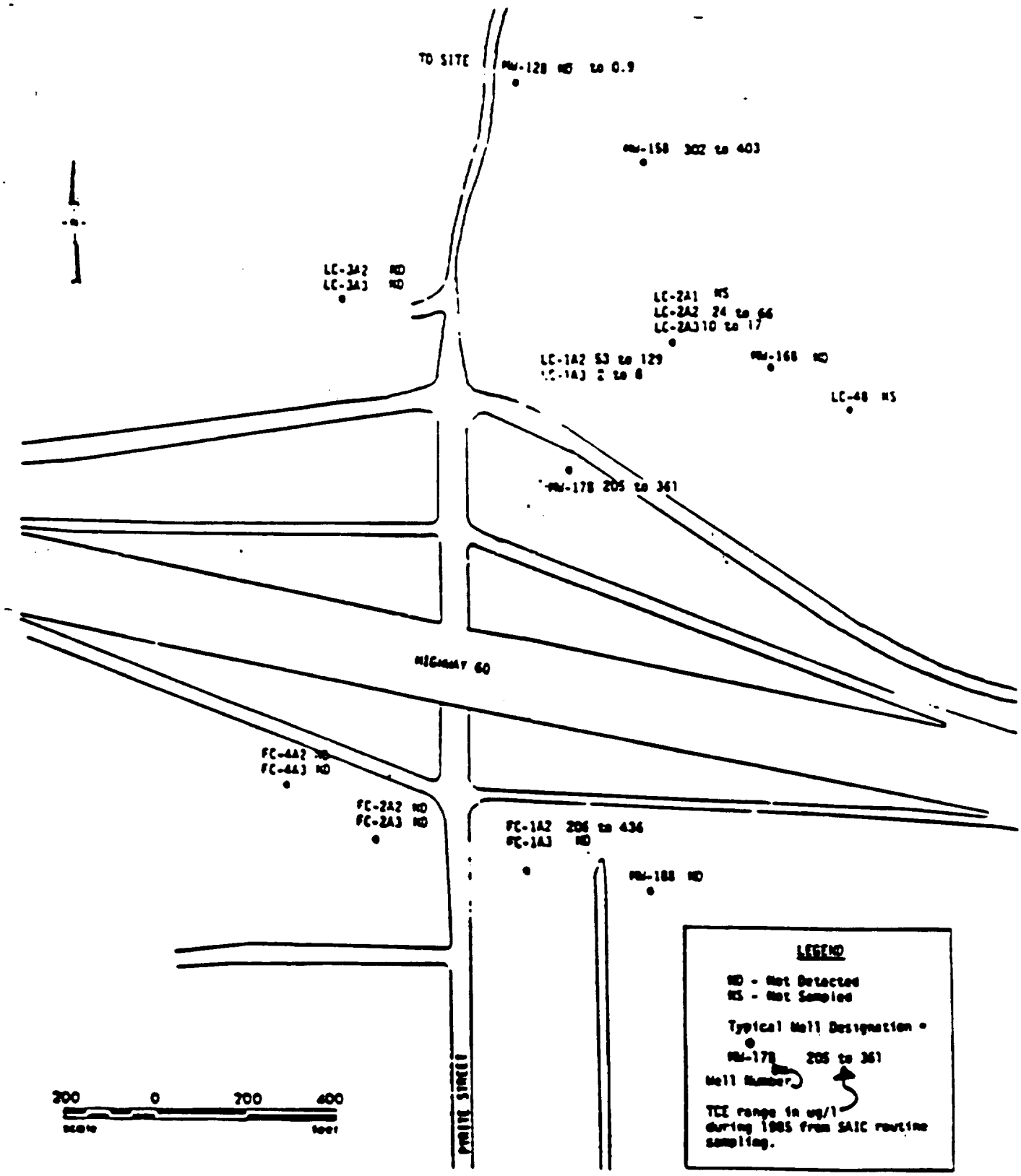


FIGURE 3

CONTAMINATION IN HWY. 60 WELLS USING TCE AS AN INDICATOR

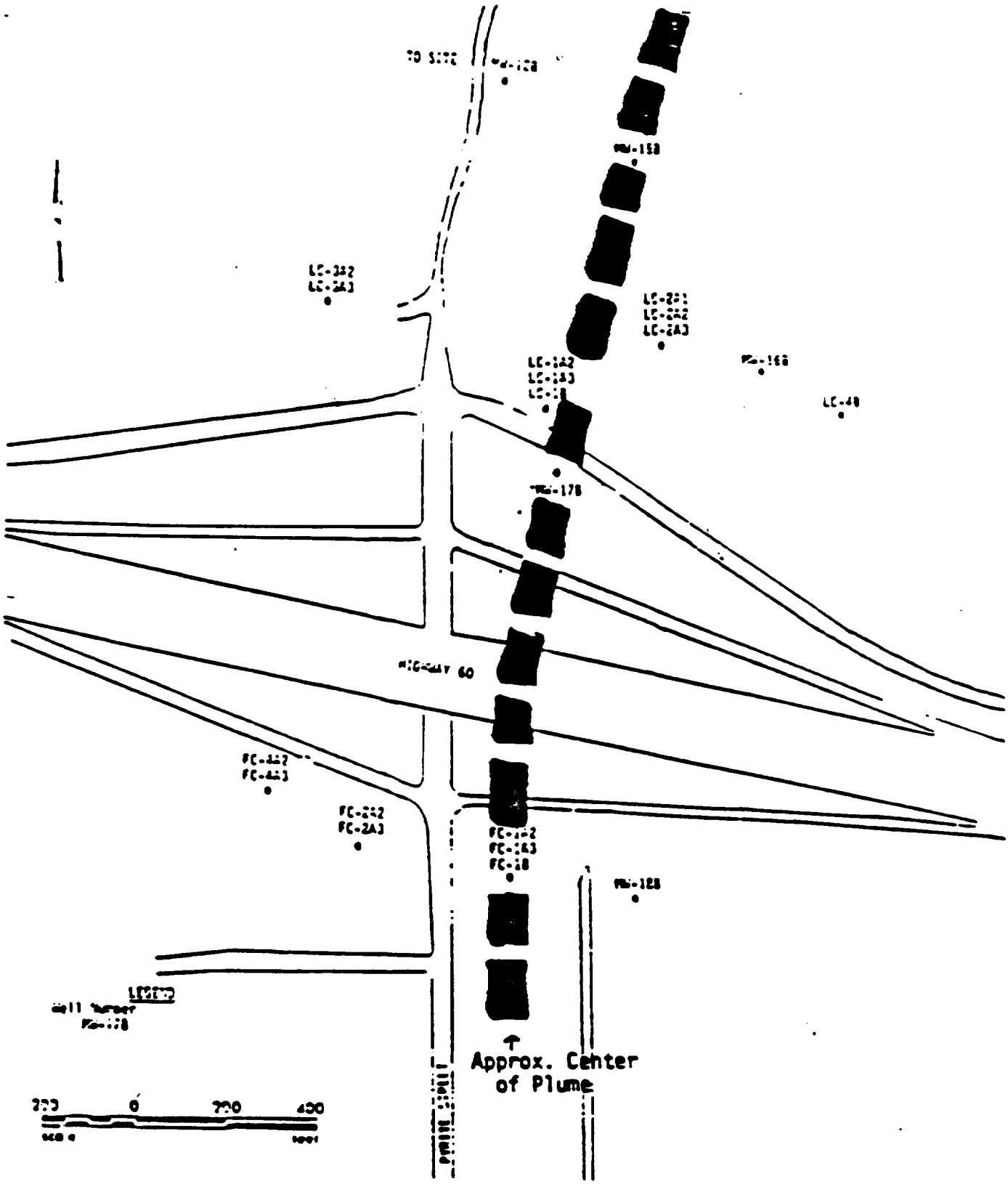


FIGURE 4

PLUME WIDTH APPROXIMATION USING TCE AS AN INDICATOR

For a summary of the hazardous substances present and their concentrations, refer to Table 1 and Figure 5 in this document from the ROD signed July 18, 1984. Since that time, new wells have been installed in the lower canyon and community areas (see Figure 6). Monitoring of these additional wells has detected groundwater contamination that has migrated downgradient from the site. Stringfellow site related contaminants have been transported at least as far as the area monitored by Well FC-558A2, in the community approximately 8,000 feet downgradient of the site (U.S. EPA NEIC analysis results from September 1985 Stringfellow site samples: memorandum from Dr. Joe Lowry to Thomas Dahl; March 18, 1986) and more recent data collected as a part of the full-scale RI/FS effort indicate that the contaminants have migrated about 2 miles downgradient of the site. Both chloroform and trichloroethylene were found in the sample from this well. Sulfate, calcium, magnesium and sodium have been transported at least as far as the area monitored by Well FC-251A2, approximately 7,000 feet downgradient from the site into the community. Para-chlorobenzenesulfonic acid (p-CBSA), a byproduct of the manufacture of DDT, has been transported at least as far as the area monitored by Well FC-1A2 which is approximately 5,000 feet downgradient from the site and a little south of Highway 60 (U.S. EPA NEIC analysis results from September 1985 Stringfellow site samples: memorandum from Dr. Joe Lowry to Thomas Dahl; March 18, 1986). Elevated concentrations of dissolved heavy metals and rare earths are present in onsite and downgradient groundwaters to the vicinity of MW-8B. The concentrations of these constituents (excluding uranium) diminish to non-detectable levels in the mid-canyon area between MW-8B and IW-2.

Groundwater from some of the community area monitoring wells is contaminated with organics (TCE, chloroform, chlorobenzene, and dichlorobenzene) at parts per billion (ug/l) concentration levels. Organic contaminants have travelled further from the site than metals. The concentrations of metals tend to decrease more rapidly with distance from the site, presumably because the metals begin precipitating as the pH becomes more neutral away from the site and also because of interaction with soil matter (e.g., adsorption). In summary, a subsurface barrier wall is in place at the south end of the site, and groundwater extraction has been conducted since 1982 to retard the flowrate of the contaminated plume. Additional groundwater monitoring has detected site-related contaminants in a plume moving downgradient of the site into the lower canyon area and the Glen Avon community, indicating the need for additional actions to increase

	UPGRADIENT	ON-SITE	UPPER CANYON	MID CANYON	LOWER CANYON		PRIVATE WELLS
					West Side	East Side	
	Springs Above Disposal Area	OW-1,2,4	MW-1, MW-3D 4B, 5B, 6B	MW-2, 3 MW-10, 2B, 7B, 8B, 9B, 13B	MW-10B, 11B, 12B	MW-14B, 15B, 16B, 17B, 18B	See Figure 5-1 Table 5-1
Inorganics (mg/l)							
Chromium	ND	1.5-270	ND-170	ND-2.6	ND	ND-0.046	ND-0.74 (1)
Cadmium	ND	0.12-7.3	ND-9.3	ND-3.6	ND	ND	ND-0.006
Copper	ND	1.7-20	ND-26	ND-0.26	ND-0.099	ND	ND-0.11
Lead	ND	ND-25	ND-2.7	ND-1.70	ND	ND	ND
Manganese	0.022-0.75	100-300	ND-1700	ND-305	ND-0.14	ND-0.92	ND-3.3
Zinc	ND-0.020	2.2-110	ND-300	ND-29	ND-0.245	ND-0.09	ND-5.6
Nitrate-N	ND-3.9	8-120	10-100	ND-115	9.6-26	ND-90	2.4-130
Sulfate	ND-325	3200-30000	1800-30000	170-27000	100-1500	100-1300	45-430
Chloride	41-70	93-5800	245-4000	60-850	37-310	45-300	26-330
pH*	7.8-7.2	2.6-4.1	2.7-6.5	3.0-7.3	6.5-7.6	6.8-7.6	6.2-8.1
Organics (ug/l)							
Phenol	ND	ND-640	ND-1600	ND-<100	ND-<10	ND	ND
1,2-Dichlorobenzene	ND	120-3000	170-2400	ND-400	ND-12	ND-<20	ND
1,4-Dichlorobenzene	ND	59-1200	70-640	ND-74	ND-<10	ND	ND
Isophorone	ND	190-3400	ND-5100	ND-310	ND	ND	ND
Chlorobenzene	ND	290-1800	50-1200	ND-140	ND-<5	ND-<5	ND
Chloroform	ND	150-900	100-1900	ND-1200	ND-6	ND-32	ND
Ethylbenzene	ND	<50-260	ND-150	ND-14	ND	ND	ND
Methylene Chloride	ND	ND-9200	ND-17000	ND-3600	ND	ND-18	ND-420 (2)
Tetrachloroethylene	ND	<50-510	ND-69	ND-8	ND	ND-<5	ND-6
Toluene	ND	140-2400	ND-1900	ND-160	ND-<5	ND-<5	ND
Trichloroethylene	ND	8200-15000	1900-10000	ND-5900	ND-31	ND-730	ND
Acetone	ND	ND-5500	ND-20000	ND-2000	ND	ND-17	ND-87 (3)
2-Butanone	ND	ND-10000	ND-77000	ND-3500	ND	ND	ND
4-Methyl-2-Pentanone	ND	430-11000	ND-21000	ND-2000	ND	ND	ND
4,4'-DDT	ND	ND-0.34	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND-0.19	ND-0.16	ND-0.06	ND	ND	ND

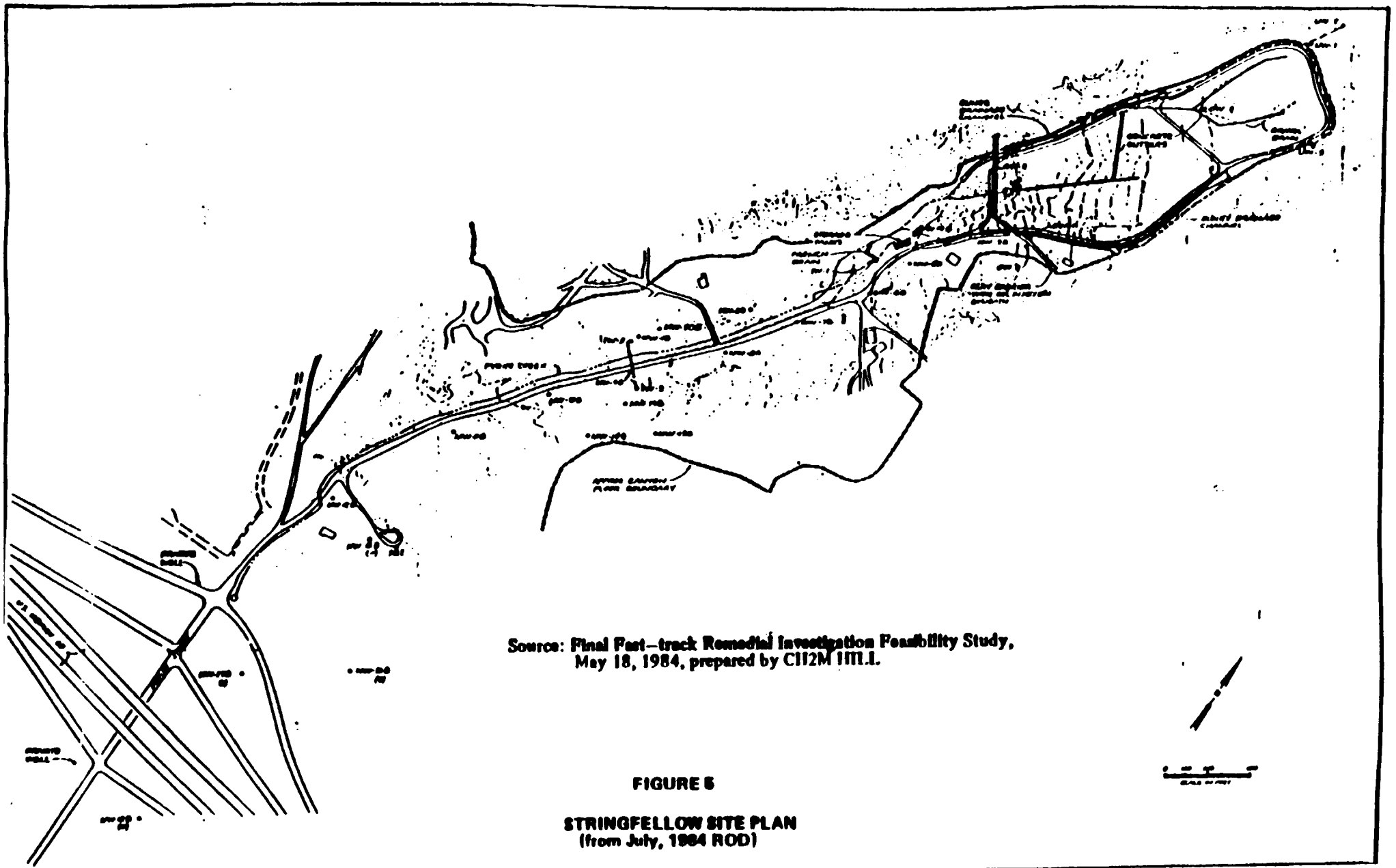
Key

ND -, Not Detected
* pH Units.

1 Subsequent sampling has shown no detectable quantities of chromium in any of the private wells.
2 420 ug/l was reported in a single instance. No methylene chloride has been detected in any of the private wells at any other time.
3 Subsequent sampling of private wells has shown no detectable quantities of acetone.

TABLE 1

CONCENTRATION RANGES FOR SELECTED CONSTITUENTS



Source: Final Fast-track Remedial Investigation Feasibility Study, May 18, 1984, prepared by CH2M HILL.

FIGURE 5

STRINGFELLOW SITE PLAN
(from July, 1984 ROD)

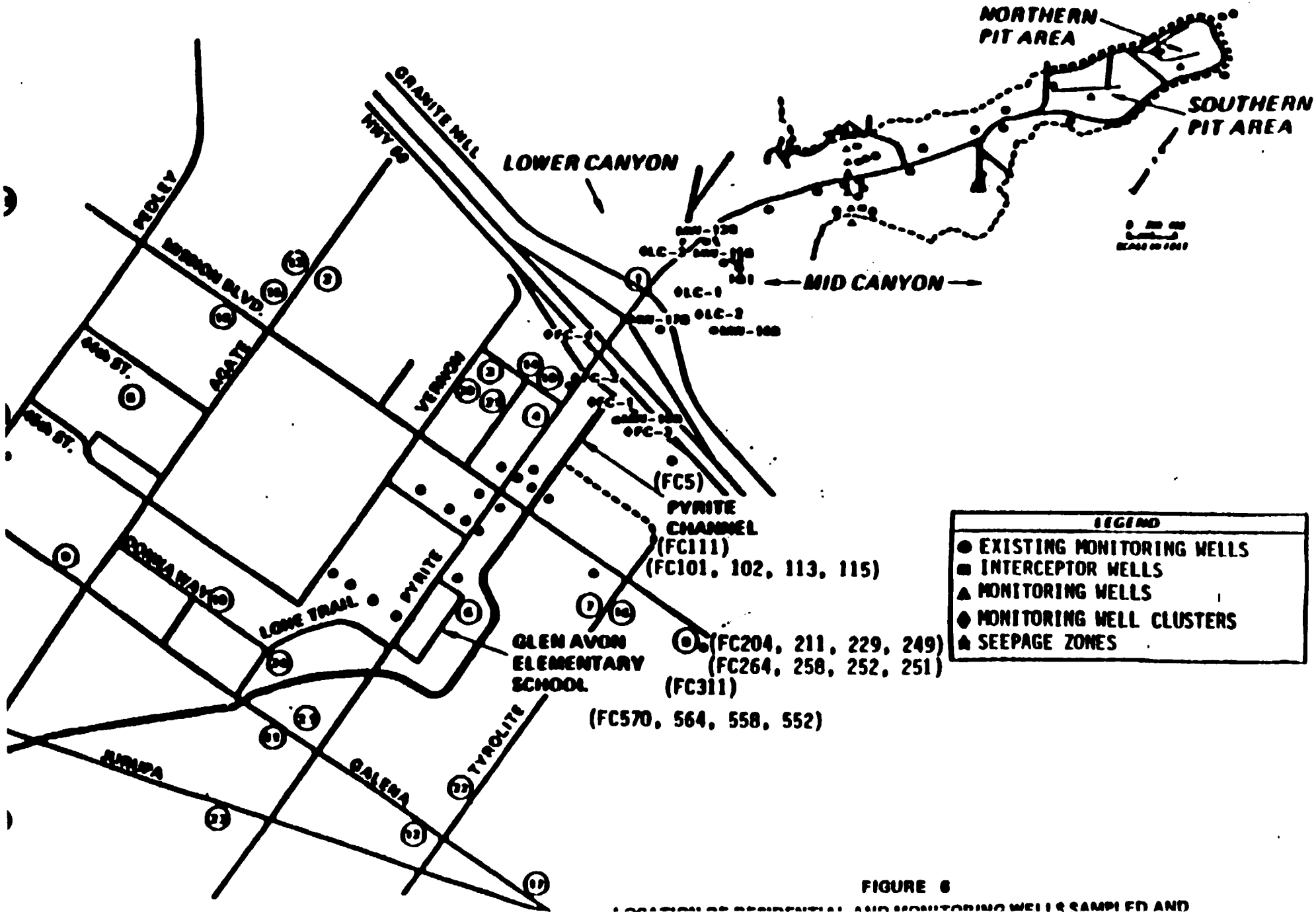

NORTHERN PIT AREA
SOUTHERN PIT AREA
LOWER CANYON
MID CANYON
GRANITE MILL
HWY 60
OLC-1
OLC-2
OFC-1
OFC-2
OFC-3
(FC5)
PYRITE CHANNEL
(FC111)
(FC101, 102, 113, 115)
(FC204, 211, 229, 249)
(FC264, 258, 252, 251)
(FC311)
(FC570, 564, 558, 552)
GLEN AVON ELEMENTARY SCHOOL
MOLLY
MISSION BLVD.
AGATE
MAIN ST.
VERNON
PYRITE
LOMA VISTA
LOMA TRAIL
RUBIDOUX
RALEIGH
TYROLITE
LEGEND
EXISTING MONITORING WELLS
INTERCEPTOR WELLS
MONITORING WELLS
MONITORING WELL CLUSTERS
SEEPAGE ZONES

FIGURE 6

the effectiveness of the current interim measures. The major mobile priority pollutants in these areas are trichloroethylene (TCE), chloroform and chlorobenzene. The TCE, chloroform and chlorobenzene levels listed below were found in September 1985 at several locations as shown on Figures 5 and 6.

	Concentration* (ug/liter)		
	TCE	Chloroform	Chlorobenzene
Mid-Canyon (Well No. IW-2)	960	140	16
Lower Canyon (Well No. MW-17B)	540	30	2
Community (Well No. PC-251A2)	100	5	0.3

*U.S. EPA National Enforcement Investigations Center analysis results from September 1985 Stringfellow site samples (memo from Dr. Joe Lowry to Thomas Dahl, March 18, 1986).

POSSIBLE ROUTES OF EXPOSURE

Soil, air, groundwater, and surface water may all be potential routes of exposure to Stringfellow contaminants. Contaminated soil occurs onsite, below the kiln dust layer, and immediately downgradient of the site. However, soil is not considered a major exposure route since the site is capped and fenced to isolate the area from general public exposure. Also, preliminary data from air monitoring tests conducted by SAIC in April 1985 indicate that the capped site does not contribute, through volatilization or suspension of wind-carried contaminated particles, adverse levels of contaminants to the air. The possibility of surface water exposure exists from surface runoff during storm events. An abnormally heavy rainfall may increase the potential for this exposure route due to the possibility of heavy erosion.

The primary concern is exposure to the groundwater since the water supply source can be used for a variety of purposes, including human consumption. As groundwater flows through the site, contaminants are transported downgradient. The movement of this downgradient plume appears to be controlled

mainly by the alluvial flow, although fractures in the bedrock may also be contributing to the transmittal of the contaminated water.

POTENTIAL RECEPTORS

Numerous private wells are located downgradient of the site. Also, three organizations supply water from wells in the Chino Basin to residential, commercial, and industrial customers in the Glen Avon area. These are the Jurupa Community Services District, the Mutual Water Company of Glen Avon and the Santa Ana River Water Company. Three relatively low volume service wells operated by the Feldspar Gardens Mutual Water Company, and located just to the southwest of the mouth of the Pyrite Canyon, are no longer in use. Groundwater exiting the canyon mixes with the downgradient regional aquifer. If the contamination spreads further into this aquifer, it could eventually contaminate the drinking water supply wells for residents in the Glen Avon and surrounding areas as well as those wells used for industrial and agricultural purposes. An alternative water supply is being provided by DHS to about 400 resident households directly downgradient of the site (refer to section under "Site History").

Groundwater exits Pyrite Canyon into the Glen Avon sub-basin aquifer, a unit of the Chino Basin aquifer. Without remediation, the potential for environmental damage is significant, because the entire Glen Avon sub-basin aquifer as well as parts of the larger Chino Basin aquifer could become contaminated. Contamination of the groundwater supply in the aquifer under the Glen Avon community could expose those who use this water to contaminants through ingestion and, to a much lesser extent, through dermal exposure and inhalation from volatilization of certain chemicals.

EXPOSURE POTENTIAL

The exposure potential to heavy metals is the same as that addressed in the earlier ROD of July 18, 1984, since they appear not to have migrated beyond mid-canyon. However, several organic contaminants are in the groundwater in the lower canyon and upper reaches of the Glen Avon community areas. TCE and chloroform are the most mobile of the priority pollutants onsite in groundwater, and both chemicals have been detected in the community, thus presenting the greatest immediate danger to community groundwater users. TCE has a relatively low acute toxicity, but exposure to high doses can cause central nervous system depression, long-term neurological effects, dermatitis, and peripheral neuropatheis. Potentials for TCE as a human carcinogen are at present unknown, but it is a proven animal carcinogen. Chloroform is a volatile compound that can cause nausea,

dizziness, and acute central nervous system depression, as well as chronic liver and kidney damage. This substance has been listed as a human carcinogen by EPA.

The Clean Water Act criteria, adjusted for drinking water (EPA/540/6-85/003) suggests the one in one million carcinogenic risk concentrations of 2.8 ug/l (micrograms per liter) for TCE and 0.19 ug/l for chloroform. Based on the TCE and chloroform levels listed earlier in this section (under "Nature and Extent of Contamination" and Well No. FC-251A2), the community risk level for TCE and chloroform from drinking contaminated groundwaters may appear high. Health risks from exposure to contaminated groundwaters are expected to vary significantly throughout the community, and relate to the source of the extracted groundwater relative to the location of the contaminant plume.

The other significant exposure potential is through surface water exposure from water onsite and from upgradient water running on the site, especially during large storm events. This exposure potential is limited because the site is capped, some drainage improvements have been completed, and normal rainfall amounts are relatively small. However, this exposure potential can be limited to an even smaller potential improving surface drainage, especially in the upgradient areas.

ENVIRONMENTAL ASSESSMENT

Vegetation in Pyrite Canyon and surrounding hills is sparse and typical of a coastal sagebrush community, dominated by coastal sagebrush, white sage, and black sage. According to a map included in the Riverside County Comprehensive General Plan, there are no unique plant communities in the Glen Avon area. Also, there are no endangered, rare, or threatened animal species in the area near the Stringfellow site. Even though several birds, mammals, reptiles, and amphibians have been seen in the vicinity of Pyrite Canyon, no significant, rare or unique permanent habitat in the vicinity of Highway 60 has been observed. Occasionally, rabbits and sheep use this grasslands area in the lower canyon as a corridor for movement.

ENFORCEMENT ANALYSIS

On April 21, 1983, the United States and the State of California filed a civil suit in the United States District Court for the Central District of California. Eighteen generators, four transporters, and nine owner/operators were named as defendants in the lawsuit (refer to July 1984 ROD). While this litigation proceeds, and EPA continues its efforts

to recover past and future costs of cleanup from potentially responsible parties (PRPs), specific discussions with some PRPs are being held on the early implementation actions (EIAs) presented in this ROD Addendum. These discussions have focused on the design and implementation of the EIAs and they began in the fall of 1986. The PRPs have been given the opportunity to perform the design and implementation of these EIAs subject to EPA and State approval and oversight. However, negotiations have not been successful in producing an acceptable agreement between the EPA, State, and PRPs.

ALTERNATIVES EVALUATION

REMEDIAL OBJECTIVES

The overall objective of the RI/FS for the Stringfellow site is to determine a final remedy that protects public health and the environment. The following specific objectives have been identified for the final remediation process:

1. Prevent further plume migration.

2. Prevent clean water from becoming contaminated by isolation and/or treatment of the contaminated soil/waste mixture.

3. Manage community and site area groundwater which may adversely affect public health or the environment.

4. Route runoff and run-on to prevent surface water contamination.

5. Prevent air emissions from the site which may adversely affect public health and/or the environment.

6. Prevent and control air emissions of contaminated material during the implementation of the remedial action.

7. Manage the onsite area to prevent direct contact by the general public.

ALTERNATIVES CONSIDERED

A screening of 86 potentially applicable remedial technologies was performed by SAIC. Remedial alternatives were developed by compiling suitable technologies into feasible systems to manage and control the source waste material and the migrating contaminant plume at the site. These remedial actions were developed and screened for control and management of four primary types of materials: (1) uncontaminated surface water runoff from surrounding drainage areas; (2) uncontaminated groundwater from areas upgradient of the site;

(3) the contaminated soil/waste mixture; and (4) contaminated groundwaters from beneath the site and from the downgradient plume.

After the initial screening of all remedial alternatives for the site, except in the "no action" alternative, the following two remedial actions are included in all Stringfellow remedial alternatives regardless of the specific remedial actions implemented in upgradient or onsite areas:

1. Diversion of upgradient surface waters with a new peripheral channel north of the original site.

2. Mitigation of the downgradient contaminated plume using a groundwater barrier system and management of the extracted contaminated groundwater.

This ROD will deal with only these two remedial actions and the "no action" alternative. The final remedy will not be selected until at least another year. These remedial actions are consistent with all the remaining potential remedial alternatives and can be implemented now. In the following sections the "no action" alternative will be compared with each alternative with respect to selection of these remedies as early implementation actions. Early implementation actions are those actions which are part of each alternative remedial action remaining after the FS initial screening, and which will increase the effectiveness of the existing system in meeting the objectives of protecting public health, welfare, and the environment. Therefore, they are desirable to implement as soon as possible. Since the above two remedial actions are included in all alternatives remaining for detailed evaluation, they could be selected as early implementation actions if the "no action" alternative is rejected, and if it is determined that they will increase the effectiveness of the current remedial actions.

1. Upgradient Surface Water Management

Southward extension of the concrete channels on the east and west side of the site was approved in the July 1984 ROD for this site. Partial drainage channels to divert surface water around the site are in place to the east and west of the original site. An effective drainage control for the run-on water would involve completing the drainage system by constructing a new peripheral channel, north of the original site, which would tie into the existing east and west drainage channels. Thus, this action would be consistent with the July 1984 ROD and the alternative to install concrete channels. This would divert surface waters flowing from the north around the original site. Currently, some surface water enters the waste area during heavy rainfalls, and

increases the probability of erosion and a potential source of contaminated surface water. Diversion of uncontaminated surface water before contact with the onsite area is preferable to control of contaminated surface water after contact since it is more effective and cheaper to manage uncontaminated surface waters than treat contaminated surface water. This action would contribute significantly to meeting remedial objectives 4 (Route runoff and run-on to prevent surface water contamination) and 2 (Prevent clean water from becoming contaminated by isolation and/or treatment of the contaminated soil/waste mixture) listed earlier. It would also increase the effectiveness of the existing drainage system.

The two alternatives for upgradient surface water management are: (A1) No action; and (A2) Diversion of upgradient surface waters with a new peripheral channel at the north end of the original site.

2. Downgradient Plume Management

The July 1984 ROD approved a groundwater extraction barrier in the mid-canyon area with treatment of the extracted contaminated water at an onsite treatment plant. This alternative for the lower canyon area is similar to and consistent with the July 1984 ROD action for the mid-canyon area. A groundwater barrier, the essential elements of which are extraction wells, would be installed in the lower canyon (Highway 60) area. The objective of this action is to intercept the contaminated plume at a location just north of Highway 60 in order to (1) remove contaminated groundwater, and (2) stop additional contaminated groundwater from moving south into the community of Glen Avon.

This action will contribute significantly to meeting remedial objectives 1 (Prevent further plume migration) and 3 (Manage community and site area groundwater which may adversely affect public health or the environment) listed earlier. The action will significantly increase the effectiveness of the current downgradient plume management system by preventing contamination movement through the lower canyon. This will be accomplished by creating a hydrologic barrier using a series of extraction wells (approximately 3 to 5) installed perpendicular to the contaminated groundwater plume. Cleanup standards for the overall remedy will be addressed in the Record of Decision for the final remedy following the full-scale feasibility study.

The necessary elements of the proposed action are:

1. Interception and extraction of the contaminated groundwater.

2. Aboveground facilities for management of the extracted groundwater.

3. Proper disposal of the extracted groundwater.

There are several alternative methods to accomplish each of the above elements, as shown schematically in Figure 7. The only disposal method being considered for this early implementation action is disposal into the existing SARI line. This is because the existing discharge permit to the SARI line has an ample unused volume allocation, which can be used now. In contrast, disposal by groundwater reinjection into the aquifer or surface discharge to Pyrite Creek would involve many months, even several years, of preliminary work to obtain the necessary permits. However, it is emphasized that disposal of treated effluent by groundwater reinjection and surface discharge are still viable options for the final remedial alternative at the Stringfellow site. If a disposal system other than disposal to the SARI line is selected for the final remedial alternative, most of the improvements built for this early implementation action can be used in an alternative system or as part of a backup disposal system.

For the Early Implementation Action being proposed, a new separate treatment facility was not considered. However, a new treatment facility in the lower canyon near Highway 60 and/or expansion of the existing mid-canyon treatment plant remains a viable option for the final remedial alternative.

Referring to Figure 7, it can be seen that elimination of any disposal method except the SARI pipeline, and elimination of treatment other than at the existing mid-canyon treatment plant, have reduced the number of alternative systems possible for this early implementation action to the following: (B1) No action, (B2) Extraction and no treatment, and (B3) Extraction and treatment.

ANALYSIS OF POTENTIAL EARLY IMPLEMENTATION ACTIONS

1. Upgradient Surface Water Management

a. Alternative A1: No Action. If no action is taken to manage (divert) the upgradient surface water, this water could reach the Stringfellow site during periods of heavy rainfall. This water could also infiltrate upgradient to become groundwater and migrate to the contaminated onsite area. The existing cap over the site is not an adequate seal to prevent surface water percolation into the contaminated material onsite, and there would be a possible increase of infiltration at the site. Compared to upgradient surface water management conditions, no action (status quo conditions) is

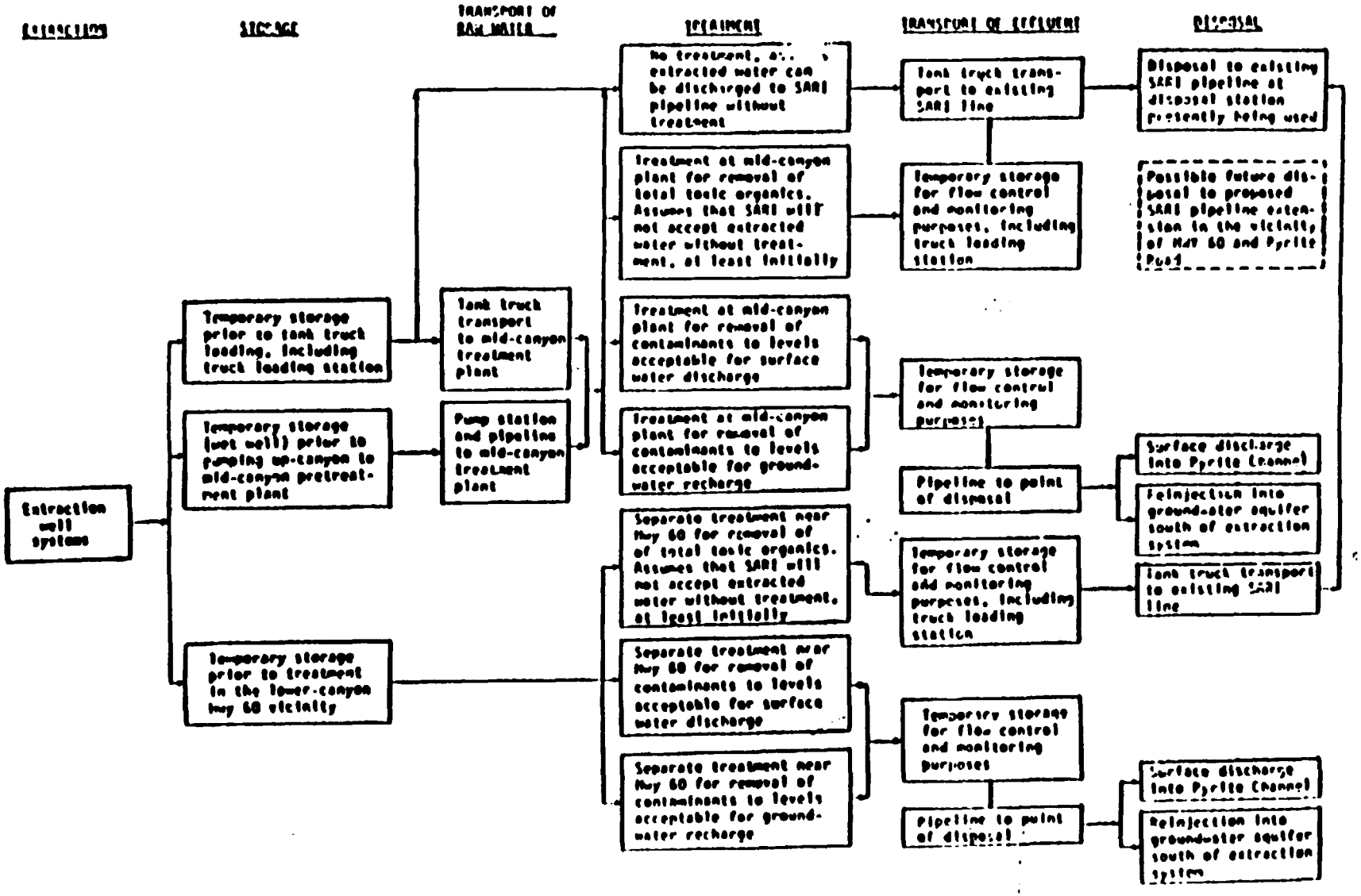


FIGURE 7

SCHEMATIC FLOW DIAGRAM OF ALTERNATIVE METHODS TO INTERCEPT AND MANAGE CONTAMINATED GROUNDWATER

currently resulting in an increased amount of contaminated water migrating downgradient from the site. It also increases the potential for erosion of the existing cap and of the contaminated soil onsite. Should significant erosion occur, it would increase potential public exposure to contaminated runoff water and increase the amount of contamination migrating from the site into the downgradient groundwater in the Glen Avon area. In short, taking no action poses a threat to public health, welfare, and the environment.

b. Alternative A2: Diversion of upgradient surface waters with a new peripheral channel north of the original site. This proposed measure would extend the existing east and west side concrete channels along the eastern, western, and northern edges of the original site (Figure 8). This measure would replace the existing unlined channel and berm system on the upper part of the site and ensure that all surface run-on is collected and conveyed around the site. The extensions will consist of 600 feet on the east side, 650 feet on the west side and 500 feet on the north side. The design of the extended channels will be similar to that of the existing channels. The lining will consist of 4-inch thick, unreinforced, precast concrete, or gunite with mesh reinforcing. The channel cross-section (Figure 9) will be trapezoidal with a horizontal base 4 feet wide, side slopes of 1.5 feet horizontal by one foot vertical, and a depth of 4 feet. The slope will average 0.06 ft/ft, giving a maximum capacity of 1,750 cfs, well above the 100-year flood peak flows for the channel extensions. Culverts will be constructed at several locations to allow vehicle access to gates in the site's perimeter fence.

Table 2 provides a summary of the various aspects of the two alternatives for upgradient surface water management.

2. Downgradient Plume Management

a. Alternative B1: No action. A significant potential threat to public health exists because of groundwater contamination from the site. Water exiting the canyon mixes with the regional aquifer under the Glen Avon community, an important drinking water supply as well as agricultural and industrial water supply. There are more than 200 private wells in the Glen Avon area downgradient of the site. To date, no private wells

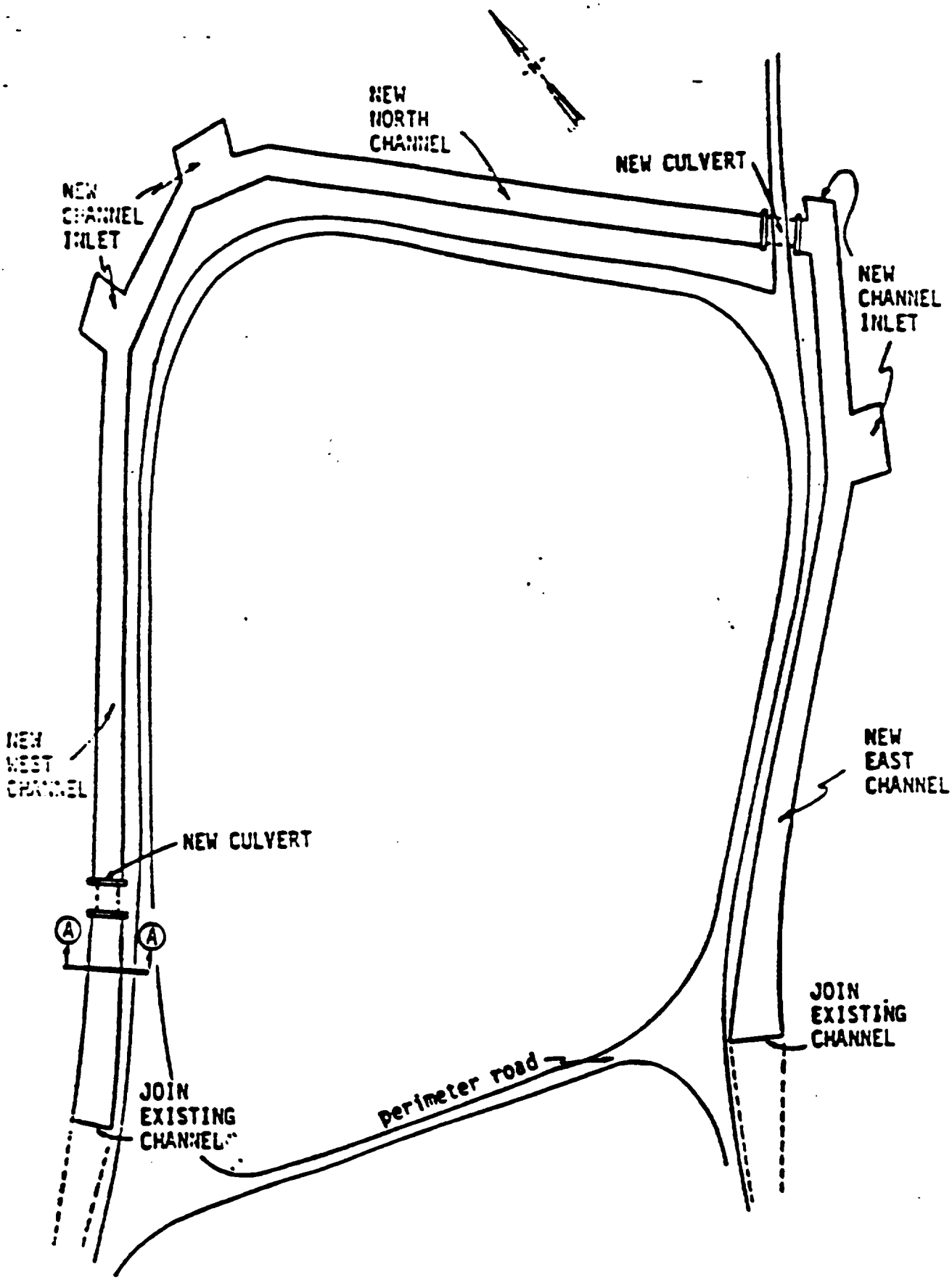
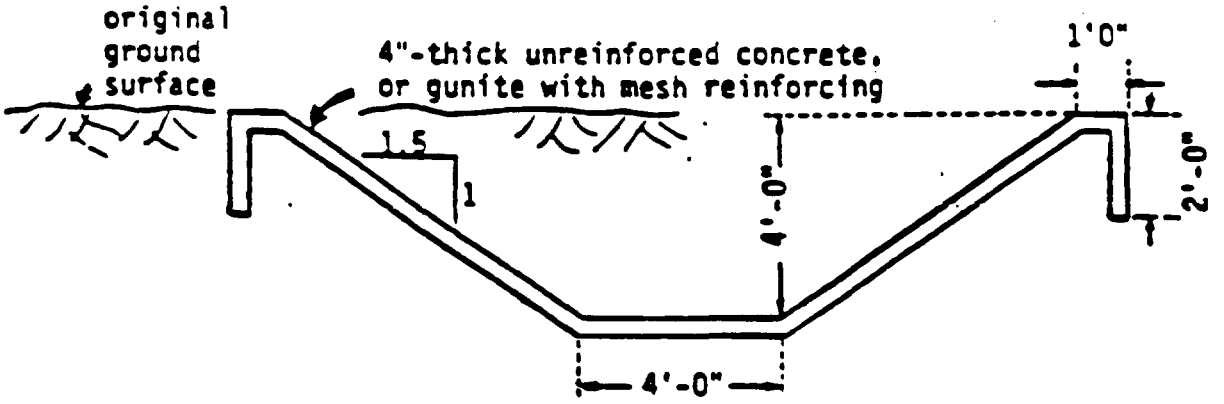


FIGURE 8

LOCATION OF PROPOSED EXTENSION



SECTION Ⓐ

FIGURE 9

TYPICAL CHANNEL SECTION

Table 2
SUMMARY OF UPGRADIENT SURFACE WATER MANAGEMENT ALTERNATIVES

Alternative	Estimated Cost* ($1,000)	Implementability	Reliability	Environmental Impact	Estimated Time to Implement
A1: No action	0	--	Not reliable during periods of heavy rainfall.	Increases amount of contaminated water migrating downgradient. Increases potential public exposure to contaminated runoff water.	--
A2: New peripheral channel north of site	Capital = 284 O&M = 10/yr 30-yr present worth at 10 percent discount rate = 291	System is basic civil works construction and can be readily implemented. Construction is within the existing site. No permits or other institutional constraints anticipated.	System is reliable, provided channels are cleaned periodically.	No adverse environmental impact anticipated	Procurement of design contractor and detailed design = 3 months Construction = 3 to 4 months

*Based on mid-1986 costs

currently being used as a source of drinking water have become contaminated; however, the potential will increase if no action is taken and additional contaminated groundwater will migrate into the community.

Chemical analyses of water samples taken from recently installed monitoring wells during the ongoing RI/FS approximately 2 miles downgradient of the site indicate that levels of TCE exceed drinking water guidelines. Monitoring wells in the lower canyon area have detected TCE levels in excess of 500 ug/l. In addition, water from wells in this area contains elevated levels of chloroform, chlorobenzene, dichlorobenzene, sulfates, and chlorides. Unless action is soon initiated, these contaminants (many are known human carcinogens) will migrate further downgradient and contaminate portions of the regional aquifer under the Glen Avon community. This contamination will be greater in magnitude and areal extent than presently detected in the community areas. The spread of contaminants threatens public health and environmental quality.

Further spread of contaminants in the downgradient plume will increase the cost of the final cleanup. The additional costs for further spread of the contaminants may include the installation of additional monitoring wells in the community to define the extent of the plume, additional sampling and analysis, additional extraction facilities, and treatment of additional water as the result of dilution.

b. Alternative B2: Extraction and No Treatment. This is the no treatment alternative which presumes that the existing SARI pipeline discharge permit can be modified through discussions with SAWPA to allow discharge of untreated groundwater that meets the quality requirements of the discharge permit. The alternative includes extraction wells, temporary storage with truck loading station either at the well field or at the mid-canyon treatment plant, tank truck transport to the SARI pipeline, and disposal to the SARI pipeline.

Major components of this alternative are described below:

Extraction system. Preliminary conceptual design anticipates installation of approximately 3 to 5 extraction wells perpendicular to the contaminated groundwater plume. The extraction wells would be just north of Highway 60 in the vicinity of the existing LC wells. The wells might use electric submersible pumps or eductor pumps. Average depth will be approximately 70 feet. Observation wells will be installed to monitor

the effectiveness of the extraction wells. Appurtenances may include automatic controls (water level actuated), flow meter, well head security cover, concrete pad, fenced enclosure, and electric service.

Temporary storage. This can be done in the vicinity of the extraction wells, or the extracted groundwater can be pumped up-canyon to the mid-canyon treatment plant for storage and truck-loading (not treatment). The major reason to do the latter is to have all the monitoring and truck loading activity occurring at the mid-canyon treatment plant instead of occurring also at a separate truck loading station near Highway 60 may result in more efficient management of operations. Also, the additional storage tanks at the mid-canyon treatment plant are more strategically located for future flexibility in system operation. Decision on the location of the temporary storage will be made during the detailed design phase of this remedial action.

During the detailed design, if it is decided to use temporary storage in the vicinity of the extraction wells, storage tanks will be installed on concrete pads in a fenced area near Highway 60. If the storage tanks are full, the pumps would automatically shut off. A truck loading station would be included. Location and layout of the facility would allow convenient access for large tank trucks. The station would operate possibly 8 hours/day, 7 days/week, and an attendant would be needed.

During the detailed design, if storage at the mid-canyon pretreatment plant is decided, construction of a pump station and pressure pipeline to transport the extracted groundwater from the extraction well barrier to the plant would be required.

The pump station would be located adjacent to the storage tank and would include a small building, pumps, automatic pump controls, motor control center, electrical service, piping and appurtenances.

The pipeline would be approximately 2,600 feet long, beginning at the pump station and terminating at the 4-inch diameter Stream C pipeline recently installed from the area of the mid-canyon pumping station up to the mid-canyon treatment plant. The pipeline would be aligned adjacent to Pyrite Road at a depth of about 3 feet. Appropriate valves, controls, and other appurtenances would be installed to prevent water hammer and achieve automatic pump shutoff if the pipeline experiences a significant break.

The existing truck loading station could be used and no land would have to be purchased. The mid-canyon treatment plant parcel has adequate space to construct the additional storage tanks.

Tank truck transport to the SARI line. Vacuum tank trucks under contract would load untreated extracted water from a storage tank after the tank's contents have been sampled, analyzed, and approved for disposal to the SARI line. Using 5,500-gallon capacity tank trucks, and assuming an average flow of 30 gpm, approximately 250 tank loads per month would be hauled to the SARI line.

Discharge to the SARI line. The existing SAWPA permit for treated Stringfellow effluent allows the discharge of 0.187 mgd (approximately 5.6 million gallons/month). This permit expires at the end of 1987. This alternative and other alternatives being considered for early implementation are based on the presumption that SAWPA will renew the permit.

c. Alternative B3: Extraction and Treatment. This alternative is the same as Alternative B2 with the addition of treatment at the existing mid-canyon pretreatment plant. It includes extraction wells, temporary storage, tank truck or pipeline transport to the mid-canyon treatment plant, treatment, temporary storage of treated effluent, tank truck transport to the SARI pipeline, and disposal to the SARI pipeline.

Major components of this alternative are described below:

Extraction system. Same as in Alternative B2.

Temporary storage in the vicinity of extraction wells. Preliminary conceptual design anticipates installation of temporary storage tanks on concrete pads in a fenced enclosure near the extraction wells. The tanks would have a total capacity of approximately 65,000 gallons. If the storage tank is full, the pumps would automatically shut off. A truck loading station would be included which could load tank trucks at a rate of approximately 500 gpm. Location and layout of the facility would allow convenient access for large tank trucks. The proposed capacity of 65,000 gallons would provide storage time of 54 hours at 20 gpm extraction rate allowing 5 days/week operation of the tank trucks to the mid-canyon. If the extraction rate is at a maximum of 45 gpm, the 65,000 gallons provide 24-hour storage requiring 7 days/week tank operation.

Transport to the mid-canyon pretreatment plant. During detailed design it will be decided if tank truck transport or transport by pipeline will be used. Assuming a vacuum tank truck capacity of 5,500 gallons, an average round trip time of 40 minutes, and 24-hour operation for 7 days/week per truck, one truck could carry 1,386,000 gallons/week. At

45 gpm, the extraction wells would produce 454,000 gallons/week. Given these parameters, one 5,500 gallon capacity tank truck would be needed for transport to the mid-canyon treatment plant. If pipeline transport is used, construction of a pump station near the extraction wells as well as a pressure pipeline to transport the extracted groundwater from the extraction well barrier to the treatment plant is required.

Treatment at the mid-canyon treatment plant. In this alternative the extracted water (Stream C) is treated in the mid-canyon pretreatment plant to reduce total toxic organics. The addition of Stream C, at 30 gpm, to the mid-canyon pretreatment plant would increase the volume being handled at the plant from the present 700,000 gallons/month (Stream A, which is the extracted water from the onsite area plus Stream B, which is the extracted water from the mid-canyon area) to about 2,000,000 gallons/month. The pretreatment plant has a design capacity of approximately 130 gpm. There is adequate unused capacity to accept the additional Stream C volume. Plant operation may have to be modified from its present schedule of 8 hours/day, 5 days/week, to 8 hours/day, 7 days/week.

Temporary storage at mid-canyon treatment plant. Additional storage of treated effluent would be required at the mid-canyon treatment plant to allow sufficient storage time for monitoring and truck scheduling. Present treated effluent storage capacity is 80,000 gallons (4 tanks at 20,000 gallons each). To allow for 2 days storage of Stream C at 45 gpm, an additional 130,000 gallons of storage would be required with associated piping and appurtenances.

Tank truck transport to the SARI line. Treated effluent handling costs from the mid-canyon treatment plant to the SARI line disposal point are $4.75/ton ($0.018/gallon) under an existing contract. The tanker trucks currently make about 130 round trips/month. This would increase to about 370 round trips/month with the addition of Stream C.

Discharge to the SARI line. Same as in Alternative B2.

Table 3 provides a summary of the various aspects of the three alternatives for downgradient plume management.

COMPARISON OF ALTERNATIVES

Table 2 provides a summary of the two alternatives being considered for upgradient surface water management. Table 3 provides a summary of the three alternatives being considered for downgradient plume management. Several conclusions can

Table 3

SUMMARY OF DOWNGRADIENT PLUME MANAGEMENT ALTERNATIVES

Alternative	Estimated Cost ($1,000)	Implementability	Reliability	Environmental Impact	Public Health Impact	Estimated Time to Implement
B1: No action	0	-	-	Regional aquifer used for municipal, agricultural, and industrial water supply could become severely contaminated.	Spread of contaminants (many are known human carcinogens) into downgradient areas threatens public health.	-
B2: Extraction and no treatment	Capital[a]: 969 to 707 O&M[a]: 1,078 to 1,072	Questionable. It is uncertain at this time whether the total toxic organics (TTO) from the untreated groundwater would meet the chemical constituent limitations of the SAWPA permits. Questionable because of SAWPA permit modification. Extended time needed to demonstrate compliance with discharge permit quality requirements.	Fair. Components are mechanically proven and reliable (see Alternative B3 below). However, extracted water TTOs meeting SAWPA permit limitations are uncertain unless proven operationally for some time.	Construction activities may increase dust and noise although mitigations exist. Disturbance of native habitat due to construction. Drill cuttings disposal in proper manner. Loss of natural cover. Energy and other resources committed for an indefinite period. Reduction of groundwater supply, which may be advantageous since area below Highway 60 is experiencing a high water table. Monitoring and maintenance commitment. Slight release of volatile emissions from storage tank and truck loading station. Potential of truck accident which may result in spill. Increase in traffic on route to SARI line. Slight increase in contaminate mass carried by SARI line to Orange County. Threat to quality of regional aquifer is significantly diminished. The adverse impacts can be minimized through proper planning.	Public exposure to contaminants in groundwater is reduced with time. Truck accident/spill may increase public exposure risks.	Nine months, not including permit obtaining time which is uncertain.
B3: Extraction and treatment	Capital[a]: 763 to 853 O&M[a]: 1,098 to 1,233	Good. Some difficulty expected in the acquisition of small property parcels from existing owners adjacent to Granite Hill Road on the north side of Highway 60. These parcels are needed for the new extraction wells and the storage tank near the wells. Also, rights-of-way will be required for the pipeline.	Good. Components are mechanically proven. Short shutdowns will not significantly affect action objectives. In case of electric power failure at extraction well system, a portable generator will be available with adequate horsepower to keep the system operating. Equipment breakdown will result in only a brief shutdown because a spare pump and accessories will be kept on hand. Controls would be provided to automatically shut off the wells if the storage tank reached capacity, and an alarm would be activated. If there is a truck breakdown, a replacement truck should be quickly available. In the interim, the treated water may be stored. Stream C will be provided with only carbon treatment, which has been a reliable operation at the plant. During mechanical failures at the plant, the extraction water may be stored. Treated effluent should easily meet the quality and quantity requirements of the existing discharge permit, which is expected to be renewed at the end of 1987.	Same as that for Alternative B2 above. Also, slight increase in carbon used at the treatment plant. Regeneration of carbon has offsite potential for transportation accident with possible spill. Commitment of resources and energy at the treatment plant. Also, volume of contaminated material reduced and concentrated.	Same as that for Alternative B2 above.	Nine to ten months.

[a] Based on mid-1986 costs. The first cost figure cited is for alternative with truck transport, and the second figure is for alternative with pipe transport.

be drawn from the tables and the analyses in the preceding sections.

1. Alternative A1 (no action) has significant adverse environmental impacts and should be ruled out from consideration.

2. Alternative B1 (no action) threatens public health and the environment, and should be ruled out from consideration.

3. Alternative B2, the no treatment alternative, is clearly less expensive than Alternative B3. However, its implementability is questionable because of problems in obtaining a permit from SAWPA to discharge untreated water into the SARI line mainly due to the uncertainty of the total toxic organics (TTOs) from the untreated groundwater meeting the SAWPA permit limitations. A long-term operating and monitoring record of acceptable untreated groundwater quality may have to be established to demonstrate compliance with the discharge permit quality requirements before Alternative B2 can be implemented. This would extend the estimated implementation time for Alternative B2 beyond the 9 months reported in Table 3.

4. The decision to transport extracted groundwater from the Highway 60 area to the mid-canyon treatment plant by tank truck or pipeline is based upon: (1) the rate (gpm) at which water is extracted, and (2) the length of time that the water will be transported to the mid-canyon plant. Lower extraction rates (e.g. 15 gpm) and short term use of the mid-canyon plant favor the economies of truck transport. Conversely, higher extraction rates (e.g. 45 gpm) and a longer period of use of the mid-canyon treatment plant favor pipeline transport. Storage, delivery, and monitoring wells associated with the downgradient plume management EIA should be addressed in further detail during the detailed design of the remedial action. These systems should be reviewed during the implementation phase after the system has been operated for a period of time to determine effectiveness of operation.

5. Discussions should be initiated with SAWPA to determine if the discharge permit can be modified to allow future disposal to the SARI line of untreated groundwater that meets the disposal quality requirements without treatment (Alternative B2). A program could be initiated to provide a record of water quality from the extraction wells to determine compliance with the discharge permit quality requirements.

COMMUNITY RELATIONS

Based on interviews conducted with the community in Riverside County and Orange County in May 1986, an updated Community Relations Plan was prepared which forms the basis for implementation of community relations activities in the area. The July 1985 SAIC report on screening of 86 potentially applicable technologies and the May 1986 SAIC report on the initial screening of alternatives have been presented to the community for comments. Separate public meetings were held in Glen Avon and Orange County in August 1985 to present the results of the screening of the 86 technologies. A public meeting was held in Glen Avon on August 21, 1986 to update the community on project related events and issues and to obtain their feedback. A similar public meeting was held in Orange County on September 18, 1986. In addition, monthly progress meetings (open to the public) with the Stringfellow Advisory Committee have been conducted by the DHS and EPA project officials in Glen Avon.

Reports on the proposed EIAs were released to the public and a request for public comments was advertised in Riverside County and Orange County newspapers in February 1987. The Stringfellow Advisory Committee meeting of February 18, 1987 was also a publicized forum for receipt of public comments on the EIAs. However, no comment from the public was received on this matter during or after the 3-week public comment period in February 1987.

The proposed early implementation actions are consistent with other remedial actions taken that have community support.

CONSISTENCY WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The July 1984 ROD identified other environmental laws that may apply to the then proposed remedial measure. Since this ROD is an extension of and consistent with the actions selected in the July 1984 ROD, the discussion on consistency with other environmental laws is applicable to the proposed EIAs. The purpose of the upgradient surface water management EIA is to increase effectiveness of managing clean surface upgradient of the site. No applicable or relevant and appropriate requirements (ARARs) were identified for the surface water management EIA.

The objective of the downgradient plume management action is to intercept the contaminated plume at a location just north of Highway 60 in order to (1) remove contaminated groundwater and (2) stop additional contaminated groundwater from moving south into the community of Glen Avon. Since the extracted

water will not be used for public water supply the Safe Drinking Water Act does not apply to this remedy. The Clean Water Act is applicable to this EIA because discharge (pretreatment) requirements must be met. Since the Santa Ana Watershed Project Authority (SAWPA) has the authority to dictate what treatment requirements are necessary for discharge to their SARI sewer line, the ARARs for this remedy relate directly to the SAWPA requirements. The SAWPA permit water quality limitations for discharge to the SARI sewer line are listed in Table 4. These requirements are being met at the existing mid-canyon pretreatment plant and will continue to be met by the recommended EIA. The spent carbon from the plant will be, as is being done now, transported by a RCRA and DHS licensed hauler to a RCRA and state licensed and EPA-approved TSD facility for thermal destruction of the adsorbed organics. As concluded in the July 1984 ROD based on a memorandum from the California Air Resources Board stating that the operation of the treatment plant will have no adverse effect on air quality, the Clean Air Act requirements are not applicable to the recommended EIA; however, air monitoring may be recommended as a precautionary measure. Although the recommended EIA is not an "RCRA alternative," onsite tanks required for this action will be designed to comply with RCRA Part 264 Subpart J.

Table 4
SAWPA PERMIT WATER QUALITY REQUIREMENTS
FOR DISCHARGE TO SARI LINE

Constituent	Maximum Concentration Limits (mg/l)	Maximum Mass Limits (lbs./day)
Arsenic	2.0	3.1
Cadmium	0.064	0.1
Chromium (total)	2.0	3.1
Copper	3.0	4.7
Cyanide (total)	1.2	1.9
Cyanide (free)	1.0	1.6
Lead	0.58	0.9
Mercury	0.03	0.05
Nickel	3.51	5.5
Silver	0.43	0.7
Zinc	0.7	1.1
Total Toxic Organics (TTO) excluding PCBs and Pesticides	0.58	0.9
PCBs and Pesticides	0.02	0.03

RECOMMENDATION

Based on Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and Section 300.68(i) of the National Contingency Plan (NCP) [40 CFR Part 300, November 20, 1985] the appropriate extent of remedy shall be determined by the selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and the environment. Generally, this requires selection of a remedy that attains or exceeds applicable or relevant and appropriate public health and environmental requirements (ARARs) that have been identified for this specific site. Additionally, remedial actions that permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substances, pollutants, and contaminants are given preference over remedial actions that do not.

Considering these objectives as well as the limited scope of the EIAs, the following two remedial actions that will increase the effectiveness of the existing remedial system and that are consistent with the remedial actions selected in the July 1984 ROD for this site are recommended by EPA:

UPGRADIENT SURFACE WATER MANAGEMENT

Alternative A2. Diversion of upgradient surface waters with a new peripheral channel north of the original site.

Also, based on the July 18, 1984 Record of Decision, the existing eastern and western gunite channels will be extended to discharge surface water to Pyrite Creek. The amount of extension of the gunite channels would depend on the evaluation currently being conducted by the State of California DHS. DHS has estimated the capital cost of implementation of this action, based on extension of the gunite channels to Highway 60, as approximately $667,000.

DOWNGRADIENT PLUME MANAGEMENT

Alternative B3. Installation of a groundwater barrier system in the lower canyon area and transport of the extracted water to the mid-canyon pretreatment plant for activated carbon treatment. Treated effluent would be trucked to the SARI line for disposal. The effluent would receive additional treatment at the POTW and then be discharged to the ocean. Since groundwater is being extracted, treated, and disposed of, the volume and toxicity of the contaminants will be reduced by this remedial action. Transport of the extracted water to the mid-canyon pretreatment plant will be by tank truck or pipeline, to be decided in the detailed design of

this alternative and reviewed during implementation (initial operation). The estimated cost range of each EIA is listed below:

	Capital Cost ($1,000)	O&M Cost ($1,000/yr)
Upgradient Surface Water Management EIA	284	10
Downgradient Plume Management EIA (initially)	763 to 852	1,233 to 1,398

Alternative B2 should be implemented at a later date if, based on Alternative B3 operating data, a SAWPA permit modification is obtained for direct discharge of the untreated extracted water into the local POTW sewer, the SARI line.

The main points made in the effectiveness evaluation presented earlier are summarized below:

UPGRADIENT SURFACE WATER DIVERSION CHANNEL

- The no action alternative was rejected because of the threat of potential public exposure to contaminated runoff water during very large rainfall events, and higher volumes of contaminated groundwater migrating downgradient from the site. Flood control measures immediately north of the original site are inadequate to ensure that onsite erosion and transport of contaminated soil and water to areas downgradient of the site could not occur during future periods of intense rainfall. Onsite groundwater infiltration of surface water run-on from the northern upgradient area would result in an increased amount of contaminated groundwater from the site. The upgradient surface water diversion channel will decrease groundwater infiltration at the site and reduce the possibility of increased public exposure to contaminated runoff/sediments during future periods of heavy rainfall.

- This action is included in all remedial alternatives being evaluated in detail in the feasibility study.

- This action is consistent with and an extension of actions implemented as a result of the July 1984 ROD. It is simple to implement, reliable, and is relatively inexpensive, with low maintenance costs.

- This action has community support, has no significant adverse environmental effects, and will help in protecting public health, welfare, and the environment.

DOWNGRADIENT PLUME MANAGEMENT

- The no action alternative was rejected because findings indicate that a significant potential threat to public health exists as a result of groundwater contamination migrating downgradient from the site. High levels of groundwater contaminants have been detected in the lower canyon area, and migration of these contaminants into the community groundwater downgradient must be stopped as soon as possible. The groundwater barrier system will help considerably in meeting this objective.

- A groundwater barrier system in the lower canyon area is included in all remedial alternatives being evaluated in detail in the feasibility study. Transportation of the extracted water to the existing mid-canyon pretreatment plant for activated carbon treatment was determined to be the best and most effective way to manage this water, at least initially.

- This action is consistent with and an extension of actions implemented as a result of the July 1984 ROD. It has been proven to be implementable and reliable. Since groundwater is being extracted, treated, and disposed of, the volume and toxicity of the contaminants will be reduced by this remedial action.

- This action has community support, has no significant adverse environmental effects, and will play a major role in protecting public health, welfare, and the environment.

OPERATION AND MAINTENANCE

Upgradient Surface Water Diversion Channel: $10,000 per year. These costs include allowances for debris removal and channel repair.

Downgradient Plume Management:

Item No.	System Element	Annual O&M Cost ($1,000)
1.	Groundwater extraction system, 45 gpm max	26
2.	Temporary storage in vicinity of extraction wells	6* to 45**
3.	Transport to the mid-canyon pretreatment plant	32* to 158**
4.	Treatment at the mid-canyon pretreatment plant, 30 gpm avg	224
5.	Temporary storage at the mid-canyon pretreatment plant, 2 days for 45 gpm	68
6.	Tank truck transport to the SARI line and monitoring costs	694
7.	Disposal to the SARI line, 30 gpm	183
	TOTAL	1,233* to 1,398**

*Pipeline transport to pretreatment plant

**Tank truck transport to pretreatment plant

The State of California (DHS) has made a commitment to provide 10 percent of the construction and operational costs of the recommended EIAs.

SCHEDULE

UPGRADIENT SURFACE WATER MANAGEMENT

Complete detailed design:	September 1987
Award construction contract:	March 1988
Complete construction:	July 1988

DOWNGRADIENT PLUME MANAGEMENT

Complete detailed design:	September 1987
Award construction contract:	March 1988
Complete construction:	July 1988
Begin operation of groundwater extraction and treatment system:	August 1988

FUTURE ACTIONS

EIAs IMPLEMENTATION

A detailed design of the EIAs will be performed after their approval in this ROD Addendum. Implementation of the EIAs is expected to occur starting in early 1988. The State of California will pay a 10 percent cost-share of construction and operational costs of the EIAs unless the potentially responsible parties agree to do the design and implementation of these actions.

FULL-SCALE RI/FS

A full-scale RI/FS was funded under the cooperative agreement with DHS. DHS contractor SAIC is conducting the RI/FS for the State. The FS, expected to be concluded in late 1987, will identify a cost-effective remedial action or actions for final site closure that will protect public health, welfare, and the environment. This will include other remedial actions in conjunction with the EIAs recommended in this ROD Addendum.

REMEDIAL DESIGN

A comprehensive ROD for the Stringfellow site will select the appropriate remedial action(s) for the site in mid-1988. This will be followed by remedial design of the actions approved in the ROD.

REMEDIAL ACTION

Upon completion of the remedial design, implementation of the full-scale remedial action for final site closure will begin in 1988. It is anticipated that the State of California will apply for an amendment to the cooperative agreement to implement final site closure. The State has agreed to provide a 10 percent cost-share for remedial action activities unless the potentially responsible parties provide funding of these activities.

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RESPONSIVENESS SUMMARY

STRINGFELLOW ACID PITS
Glen Avon, California

Reports on the proposed EIAs were released to the public and a request for public comments was advertised in Riverside County and Orange County newspapers in February 1987. The Stringfellow Advisory Committee meeting of February 18, 1987 was also a publicized forum for receipt of public comments on the EIAs. However, no comment from the public or governmental agencies was received on this matter during or after the 3-week public comment period in February 1987.

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